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ABSTRACT

Small and rural schools can use the new technologies of distance education to broaden curricular offerings while facing low student enrollments and increased costs. Courses offered via audio teleconferencing permit live teacher/student interaction and often use videotape as well as two-way audio components. Programs from the University of Nebraska-Lincoln, Eastern Montana State University, and the University of Wyoming are examples of audio teleconferencing. Microcomputer linking via regular telephone lines coupled with an audio bridge over separate lines allows a computer terminal to function as an electronic chalkboard between instructor and student and provides audio interaction as well. The Mansfield Pennsylvania-Utah Teleteaching Project and the Delaware-Chenango Schools network are examples of this technology. Interactive television via satellite is one of the fastest growing distance learning technologies, offering one-way video and two-way audio. Current programs include German by Satellite and Physics by Satellite from Oklahoma State University, TI-IN Network in Texas, Utah's Accelerated Learning of Spanish via Satellite Television Project, and the Telecommunications Project at Eastern Washington University. Administrators should consider local needs and budgets, seek staff and community support before purchasing distance education systems, and provide for equipment maintenance. Addresses are given of programs described in the text. (LFL)

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TECHNOLOGICAL INNOVATIONS IMPACTING INSTRUCTION IN RURAL AND SMALL SCHOOLS

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TECHNOLOGICAL INNOVATIONS IMPACTING INSTRUCTION
IN RURAL AND SMALL SCHOOLS

I want you to know that I am deeply honored to be here this evening. I am grateful for this opportunity to participate in a discussion on rural education. I come from the arid plains of West Texas. Normally, one would be excited to see so much water. The excessively heavy rains which you have experienced the past two weeks in Oklahoma, however, is ridiculous. Certainly, we must have school administrators here tonight who are from or around the Bartlesville area. I express my concern and hope that you will recover from any damage to your homes, property, the schools and the educational programs therein.

My own roots originate in the Mountain West, and are rural. I grew up milking cows, thinning and hoeing sugar beets, cleaning pig pens and chicken coops, and doing the hundreds of other things required on a small farm. I am proud of my rural background and most grateful for it. My rural roots bring back memories of a world where I personally knew most of the people in our small Utah farming community and was known by them. It was a typical rural community where people worked hard, yet also were able to relax and enjoy life -- lots of fresh air, home cooked meals, neighborhood gatherings, church socials, and close family ties. I remember there was always a deep respect, even a reverence for the land. Smelling the aroma of fresh mown hay, swimming in the canal, walking through a field of

golden brown wheat, or catching catfish in the river are experiences and memories which will never be forgotten.

This past summer our family returned to my home. I became reacquainted with my roots and gave my children a feel for their rural heritage. It was saddening and frustrating to visit with former neighbors who had previously been very successful farmers and were now struggling to survive. Several families who had worked the same fields into the third and fourth generations had lost their farms altogether. We face in this country a farm crisis which, at best, is receiving little more than lip-service from our political leaders. I believe that the economy of our nation and the future of our society is directly linked to our farm problem. Why? Because rural America is the anchor to which so many of us return when searching for stability or as a standard by which to assess changing values. This summer when I returned to that anchor, I found that it had been jarred loose. Our nation's rural heritage is under attack.

Coupled with the farm problem, other states -- specifically Oklahoma, Texas, and Louisiana -- have been hit with plummetting drops in the price of oil thereby devastating state revenues. Education has been directly impacted. Fewer teachers are entering the profession. Others are being forced to leave due to insulting salary levels and mickey-mouse paperwork responsibilities. In some cases cuts in funding have even eliminated positions. And

all this is happening at a time when state and federal policy makers are calling for mandated reforms to improve education. Students must complete stiffer graduation requirments, schools must offer more and varied courses, teachers must pass state sponsored competency tests inorder to "prove" their abiltiy to teach, etc. Most educators, I believe, are committed to the profession and want to assure that students in their classes receive the best learning opportunities available. But how do small and rural schools provide the full range of curricular offerings mandated by the new reforms? Those of us who work in rural education know full well the handicap we face in trying to broaden curricular offerings in light of low student enrollments which increase per pupil cost of programs, facilities, and certified personnel. The most viable alternative in addressing this dilemna seems to be through new and advancing technologies. The term "distance learning" is becoming popular in the literature. It refers to the delivery or transmission of structured lesson content from a host site to previously identified receive sites. Numerous methodologies are available. The most common seem to be some form of audio teleconferencing, videotape usage, interactive television, or microcomputer linking. Most technological approaches are still very expensive, yet reductions in cost are making them increasingly attractive.

Audio teleconferencing allows the user to make conference or two-way telephone calls, using this medium as

an instructional tool permitting live teacher/student interaction. Videotaped lessons do not offer two-way communication between student and the teacher, but they do offer possibilities for curriculum expansion and can be augmented with other instructional materials.

Interactive television, whether transmitted via satellite, microwave, cable, telephone lines, or ITFS (Instructional Television Fixed Stations), actually offers two-way contact (in most cases one-way video, two way audio). Although more expensive than some methods, this is an exciting approach to meeting curriculum needs in small schools and is one of the fastest growing distance learning alternatives in the country.

Another relatively new and exciting innovation is the linking of computers to each other via modems over regular telephone lines coupled with an audio bridge over a separate set of phone lines. This allows the computer terminal to function as an electronic chalkboard between instructor and students. The audio bridge permits voice interaction between all users.

Regardless of the approach used, one cannot ignore the fact that technology is here. Unlike many audio-visual equipment items of the past, these new technologies and their hardware are not likely to end up locked away in the closet. These new technologies are the "great equalizer" in bringing the curricula of rural schools up to a level equal to that of their urban and suburban cousins. In my opinion,

if rural youth are to be provided the same educational opportunities afforded youth in our larger schools, they are going to have to be taught -- at least to some degree -- by means of "long distance." Furthermore, administrators in rural schools must keep abreast of what is happening technologically as it relates to applications for student instruction.

Interactive Television via Satellite

Oklahoma is to be commended. You are one of the leading states in the broadcast of interactive television via satellite. The German by Satellite and Physics by Satellite programs co-sponsored by Okalahoma State University and the Oklahoma State Department of Education have become a national model of interactive teacher/student/computer learning. The program is certainly cost effective. Where else could you hire a qualified foreign language instructor for $1750 per year. Granted you have an up front expense of $5000 to $10,000 the first year to purchase a satellite dish, computers and other hardware requirments, but this is only a one-time expense.

Another interactive television system broadcasting via satellite is the TI-IN Network headquartered outside Houston, Texas. TI-IN initially began as the Texas Interactive Instructional Network as little over 18 months ago when it received approval from the Texas education Agency to begin the broadcast of live, interactive televised courses to students in Texas. The network quickly dropped

the Texas title to avoid the connotation that it was restricted to the Lone Star state. Known now simply as the TI-IN Network, it broadcasts instruction daily to a growing number of receive sites in Texas, California, Arkansas, Iowa, South Dakota, and Oklahoma. Many other states are expressing interest in the network. Isn't it interesting that the two states most adversely affected by the drop in oil prices have spawned the leaders of interactive TV learning via satellite? I think it says something for Oklahoma and Texas.

TI-IN's satellite instruction operates a little differently than Oklahoma's. Instead of only two broadcasts per week for each course offered, it broadcasts lessons five days per week for each course. Furthermore, TI-IN offers a curricula of 20 different high school courses. Some of these include Latin, computer science, calculus, business management, Spanish, Trigonometry, French, German, etc. Unlike OSU, TI-IN does not use computer assisted instruction. Instead, TI-IN seems to perpetuate the existing -- and familiar -- model of teacher-present/student recite pattern of traditional classroom instruction. This and the variety of courses available may be reasons why the network is growing so rapidly. Other factors may be that TI-IN offers much more to subscribing schools than just accredited high school courses. Other offerings include a large array of enrichment programs for levels K through 12, extensive inservice training for teachers and

administrators, staff development training, and test reviews for both teachers and students.

The first year costs for purchase of equipment, which includes subscription to the network, are about $15,000. Thereafter, the annual subscription fee for all high school courses is based on the number of students per school who register for satellite instruction. For each block of nine students, registering in any mix of the 20 courses offered, the fee is $3750. Fees for inservice training, staff development, and test reviews are separate.

Another satellite vendor is the Accelerated Learning of Spanish via Satellite Television Project jointly sponsored by the Utah State Department of Education, IBM, and Bonneville International (a priviate satellite firm). In truth, this is not an interactive televison project because there is no audio-talk back component to allow receive site schools to telephone into the master teacher and ask questions during a lesson broadcast. Also, the system broadcasts previously recorded videotapes -- not live instruction. Broadcasts are aired every other day (80 broadcasts during the course of the school year). On the non-broadcast days, students study the language using IBM PC junior computers. The system includes voice systhesis modules, similiar to the Oklahoma German by Satellite program. Excellent instructional materials are provided and students engage activily with the computer. Regardless of these strengths, the system lacks the capability for

students to interact with the TV teacher during the lesson broadcasts. Furthermore, schools on the system (27 in 1985-86) are required to purchase a downlink satellite dish. This seems like an unwise investment if all you are going to use it for is to pick up the signals of a videotaped program. The strength of satellite is that it allows for live broadcasts and live teacher/student exchange. Costs for the Utah program, which is limited solely to Spanish language, is $1600 per year. Schools are required to purchase their own satellite dish and IBM PC junior computers, and IBM XT computer for networking between the PC's. Total estimated hardware costs to accommodate 10 students is $18,500.

The newest vendor into the interactive television satellite market is Eastern Washington University located outside Spokane. The Telecommunications Project began uplinking four high school courses -- Spanish, Japanese, advanced senior English, and calculus -- in September of this year. Fifteen school sites are presently receiving the signal. This project is very similiar to the TI-IN Network in that live, interactive broadcasts are transmitted five days per week. The hardware cost is a little above $15,000. Annual subscription rates are based on a per pupil basis of $537 per student per course. We can expect to see other interactive satellite vendors enter the arena in the future.

Audio Teleconferencing

The correspondence study department at the University of Nebraska-Lincoln offers several advanced placement and dual credit correspondence study courses to rural high schools. The program differs from traditional correspondence study in that six to eight times during the semester in which students are enrolled in a course, they are linked at their school by a speaker phone with the "at-a-distance" instructor from the University. Two-way aduio interaction results. The cost to individual schools is about $220 for the hook-up and speaker phone, plus the cost of long distance telephone charges. The tuition cost for students enrolling for dual credit is approximately $130 per semester hour of credit.

The University of Wyoming at Laramie operates a REDI-NET teleconferencing system. REDI-NET is a 24 port teleconferencing bridge which is supplemented with videotape and print components sent previously to the schools. Present use focuses on the offering of college level courses to distant sites. High schools which allow advanced placement students to participate in the program, thereby receiving dual credit (college and high school) are charged $130 per student per one-half Carnegie unit. To use the system, the instructor "hooks up" to distance sites connected via telephone lines and verbally introduces a video lesson. The video component (videotape) is then played locally at each site, after which the instructor

returns to the audio network and conducts a seminar. Eastern Montana State College in Billings operates a similiar system which provides courses for selected junior and senior high schools, as well as inservice training for teachers.

Computer Linking with Audio Interaction

The Mansfield Pennsylvania -- Utah Teleteaching Project is a telephone based system consisting microcomputer generated graphics and an audio bridge transmitted over regular telephone lines. The project is operative in Garfield School District in Utah and at Mansfield University in Pennsylvania. The computer becomes in essence an electronic chalkboard. Equipped with a light pen, the instructor can send whatever kind of written or graphic message desired over a dedicated phone line which then appears on on-line microcomputers or a 25 inch TV monitor at the recieve sites. If desired, the instructor can input written messages via the keyboard terminal. Two-way audio interaction is over another dedicated phone line via an audio bridge. With an audio bridge, students at the distance sites can communicate with other students (in other receive sites) as well as the instructor. The system uses Apple IIe microcomputers. Costs for the system are about $3000 per station, plus long distance telephone charges.

Another very similiar tele-learning network is operating in the Delaware-Chenango Schools of upper-state New York. Again, the microcomputer becomes a type of

electronic chalkboard while students interact verbally with their instructor and other students over an audio bridge. The cost per school ranges between $3000 to $3500. The long distance charge for telephone line use over the audio bridge is about $.40 per minute.

Other Technologies

The models and programs which I have mentioned only briefly here are certainly not exhaustive. These are merely some of the highlights. Still, many other exciting applications of technology are occuring in small and rural classrooms around the country. I have purposely not mentioned interactive television via microwave or cable systems, simply because there are so many models of these programs already in existence. Videodiscs, fiber optics, freeze frame, slow scan video are merely a few of the other technologies that have great potential to improve instructional offerings in small schools.

Administrators should use judgement, however, before adopting a system. Carefully consider your needs and budget capability. Seek support from other school leaders, the community, and key groups before investing in expensive technologies. Most systems require an up-front purchase of hardware items and an ongoing annual subscription or use fee. Contact vendors and make cost/service comparisons. Anyone who drives a car knows that technology doesn't always work. The more technology you hook together to form a system, the greater the possibility that things can go

wrong. Who is going to fix things when they break? Maintenance agreements are important considerations in the negotiation process. We should also remember that because of the diverse nature of rural America and the diversity among rural schools, no one model or practice "fits all sizes." Application or modification of existing practices must be done from the perspective of what is the best approach to meet local needs

We live in an age of ever increasing change and advancement. School administrators today do not need to become technological experts, but there is wisdom in becoming technologically aware, and maintaining that awareness, of applications that will enhance learning opportunities for students in rural schools. In the past we used such approaches as correspondence study courses, pairing agreements, traveling teachers, etc. in our efforts to provide students will a full range of curricular offerings. New and better approaches are now available through technology. Distance learning is indeed sweeping this country, and among the beneficeiaries will be our nation's rural and small schools.

For more information on technological approaches which can serve as curriculum expanders in rural and small schools contact the following:

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